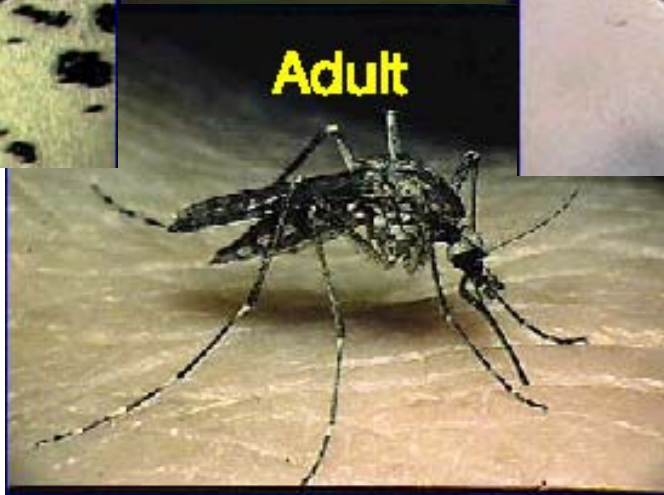
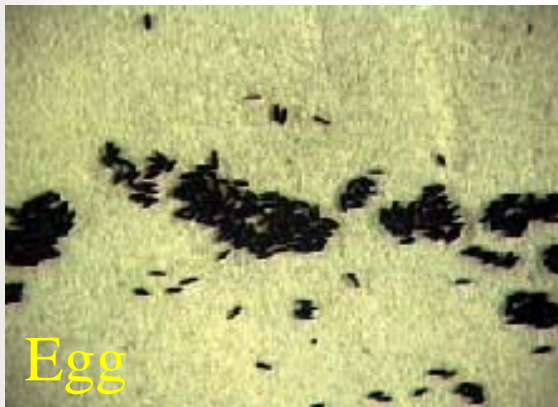


# MOSQUITO PROGRAM in UTAH in 2004



A photograph of an American Crow standing on grass. The crow is black with a long, straight beak and is facing left. The background is a blurred green field.

# Sources

# The Birds

# Corvidae

## Jays, Magpies, Ravens & Crows



# Raptors

- 15 species tested
- 3 groups
  - Hawks-Family Accipitridae
  - Falcons-Family Falconidae
  - Owls-Family Tytonidae and Family Strigidae
- Lower percent positive than Corvids



**"Germs don't jump!"**



# Transmission

## ■ The BIG Fs

■ **F**ingers

■ **F**ood

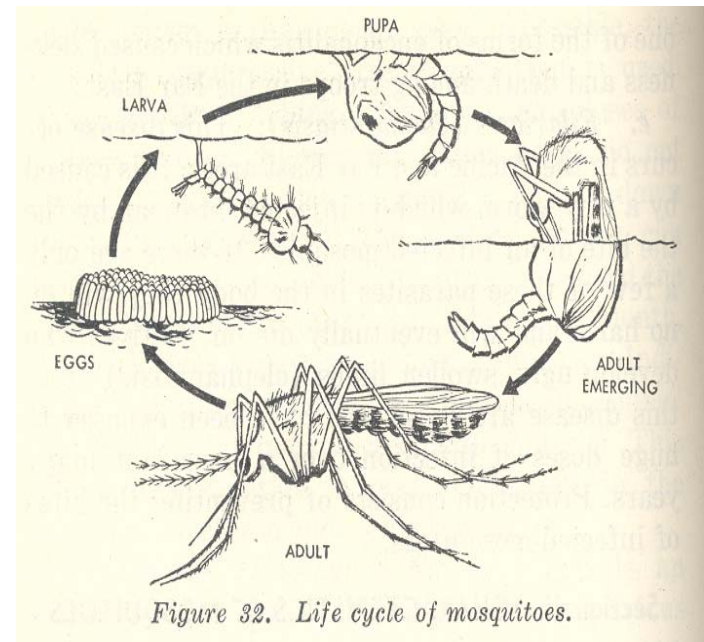
■ **F**eces

■ **F**luids

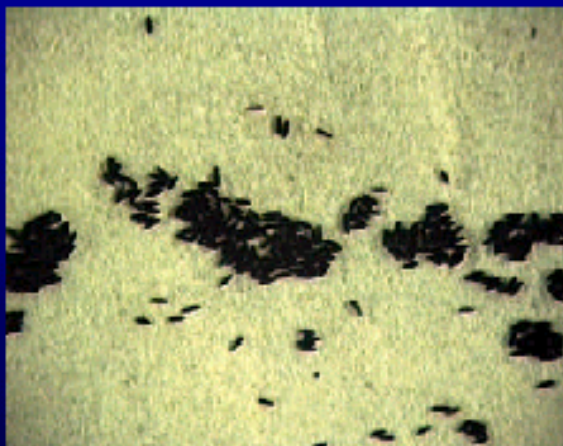
■ **F**lying Things

■ **F**ooling Around

**F S**



# Mosquito Life Cycle



**Egg**



**Larva**



**Pupa**

# Mosquito Habitats



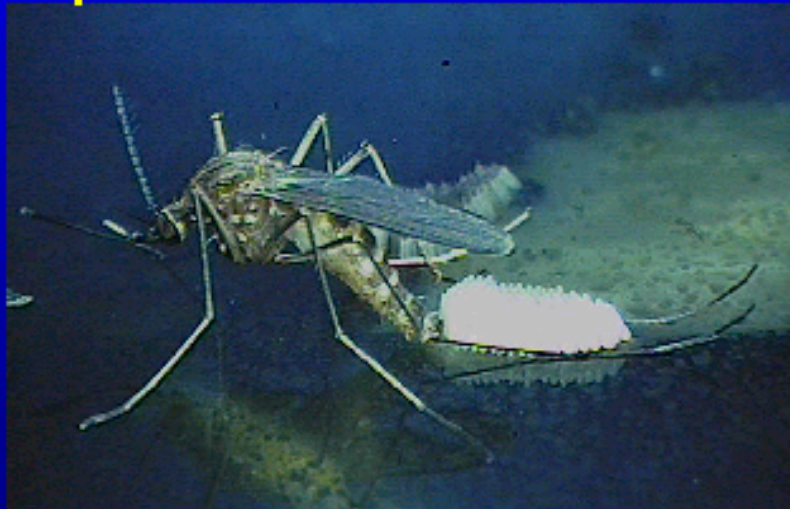
Swamps and  
standing water

Floodwater

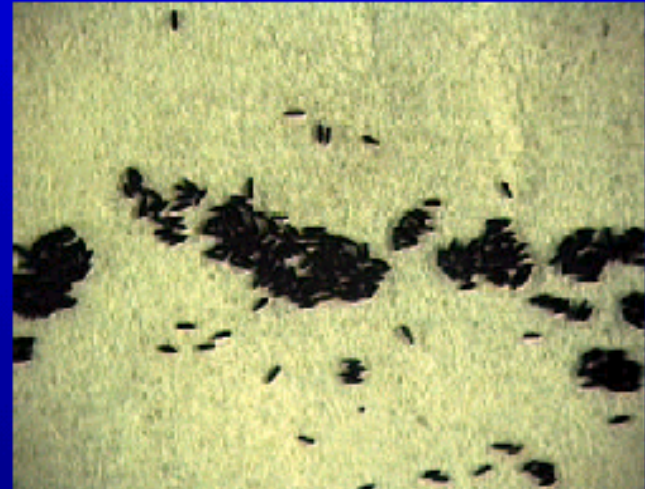


# EGGS

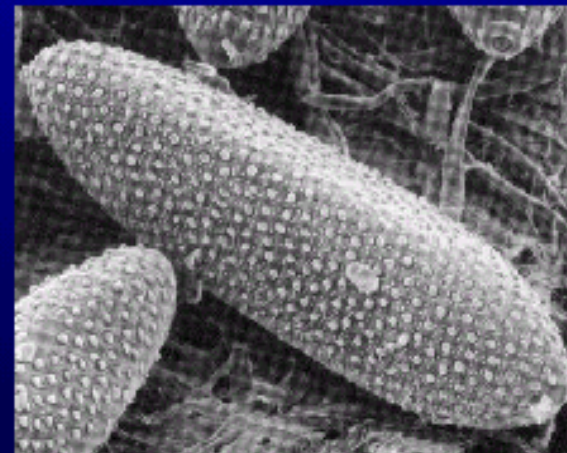
Female laying egg raft on permanent water



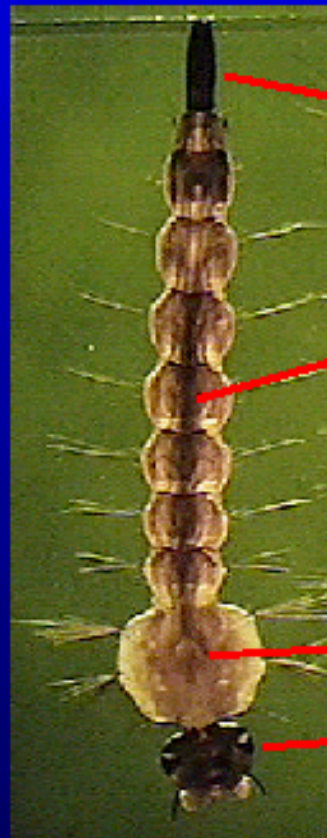
Floodwater eggs



Electron Micrograph of Mosquito Eggs



# LARVA

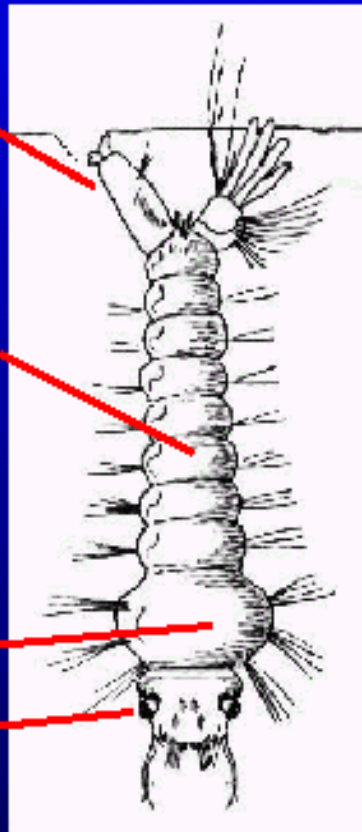


Siphon

Abdomen

Thorax

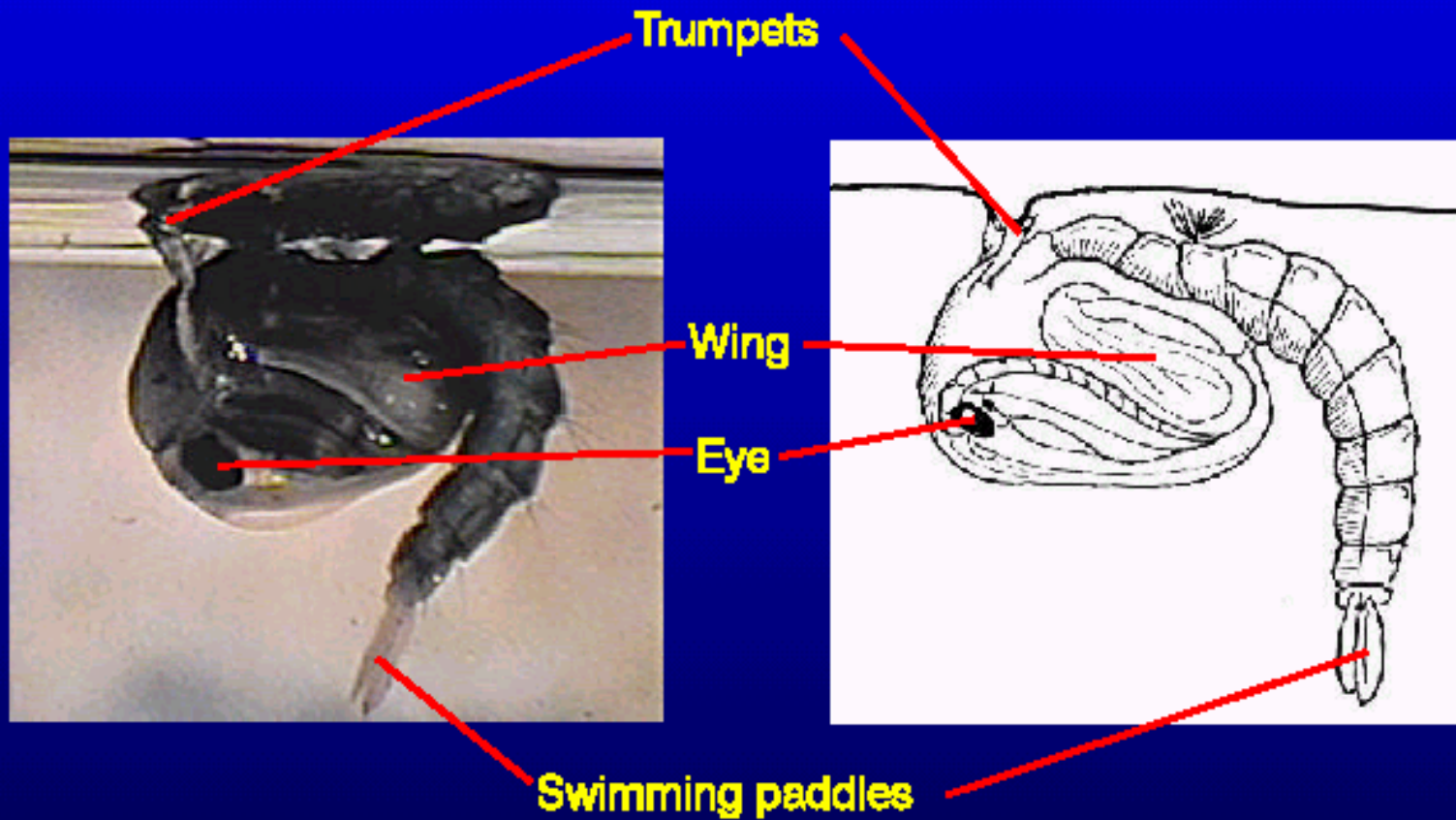
Head



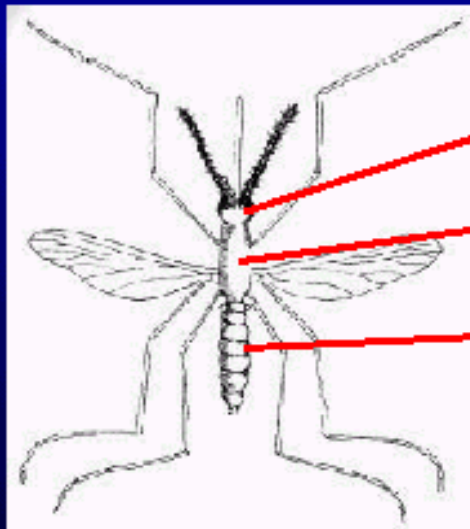
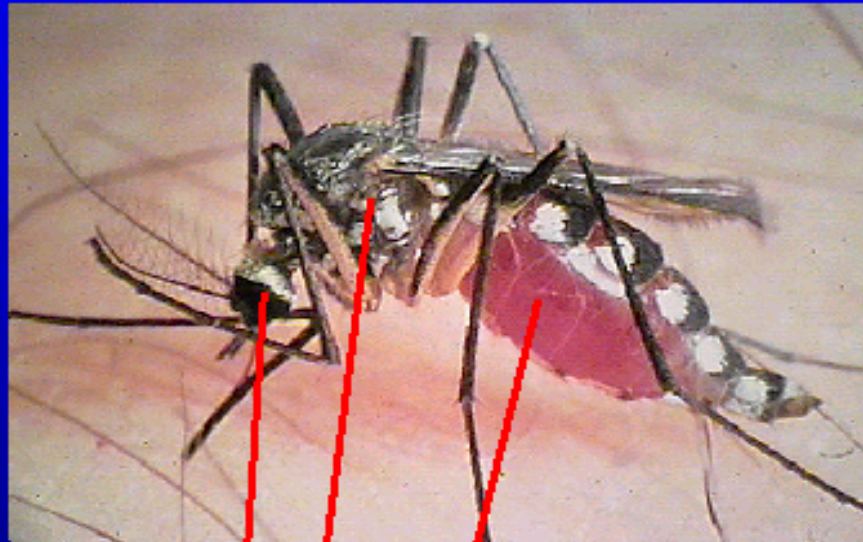
Mouth brushes filter food particles from the water



# PUPA



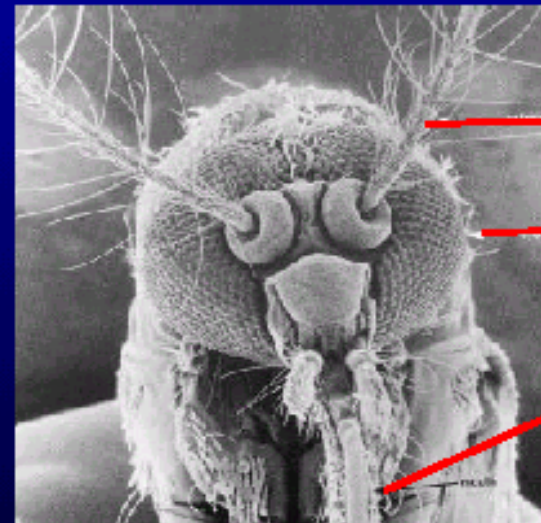
# ADULT MOSQUITO



Head

Thorax

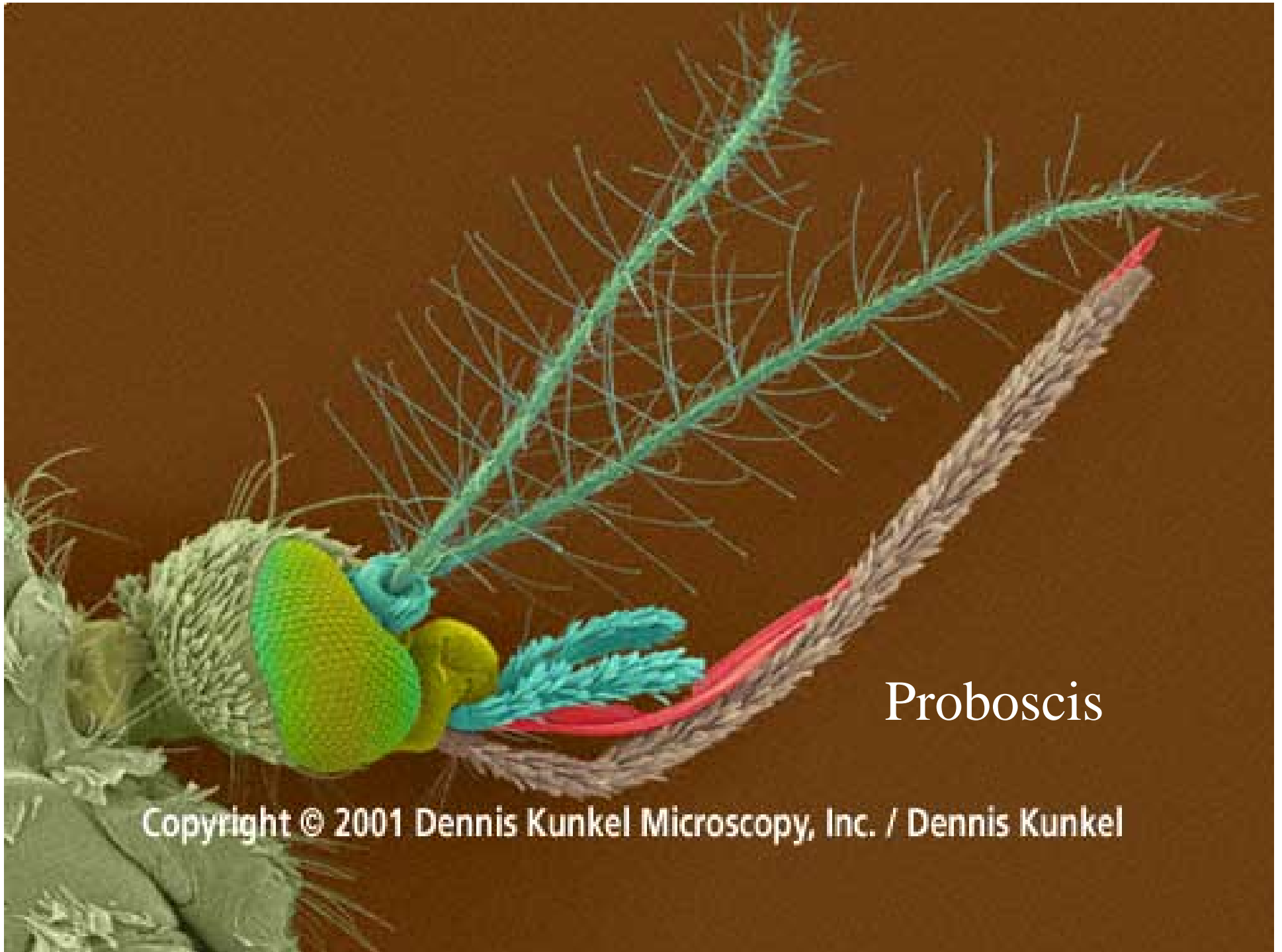
Abdomen



Antenna

Eye

Proboscis



Proboscis

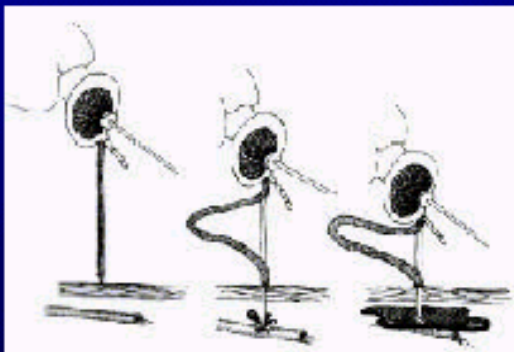
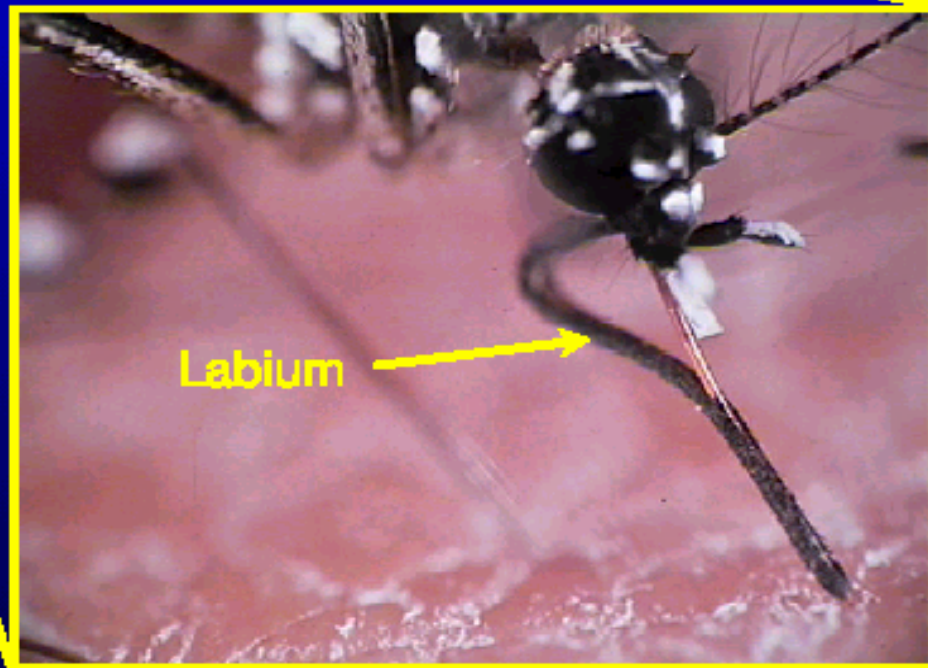
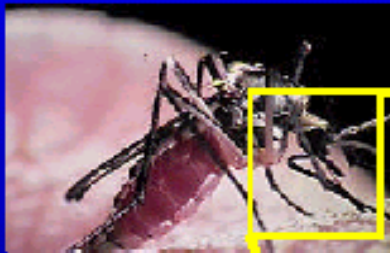
Copyright © 2001 Dennis Kunkel Microscopy, Inc. / Dennis Kunkel

# Host Location



(Artwork courtesy of: Mosquitoes in the Classroom)

# Mosquito Blood Feeding



Labium (sheath) folds back as stylets enter the skin



Malaria

Yellow Fever

Dengue Fever

# Encephalitis In The United States

Western Equine Encephalitis: Bird-Mosquito Cycle

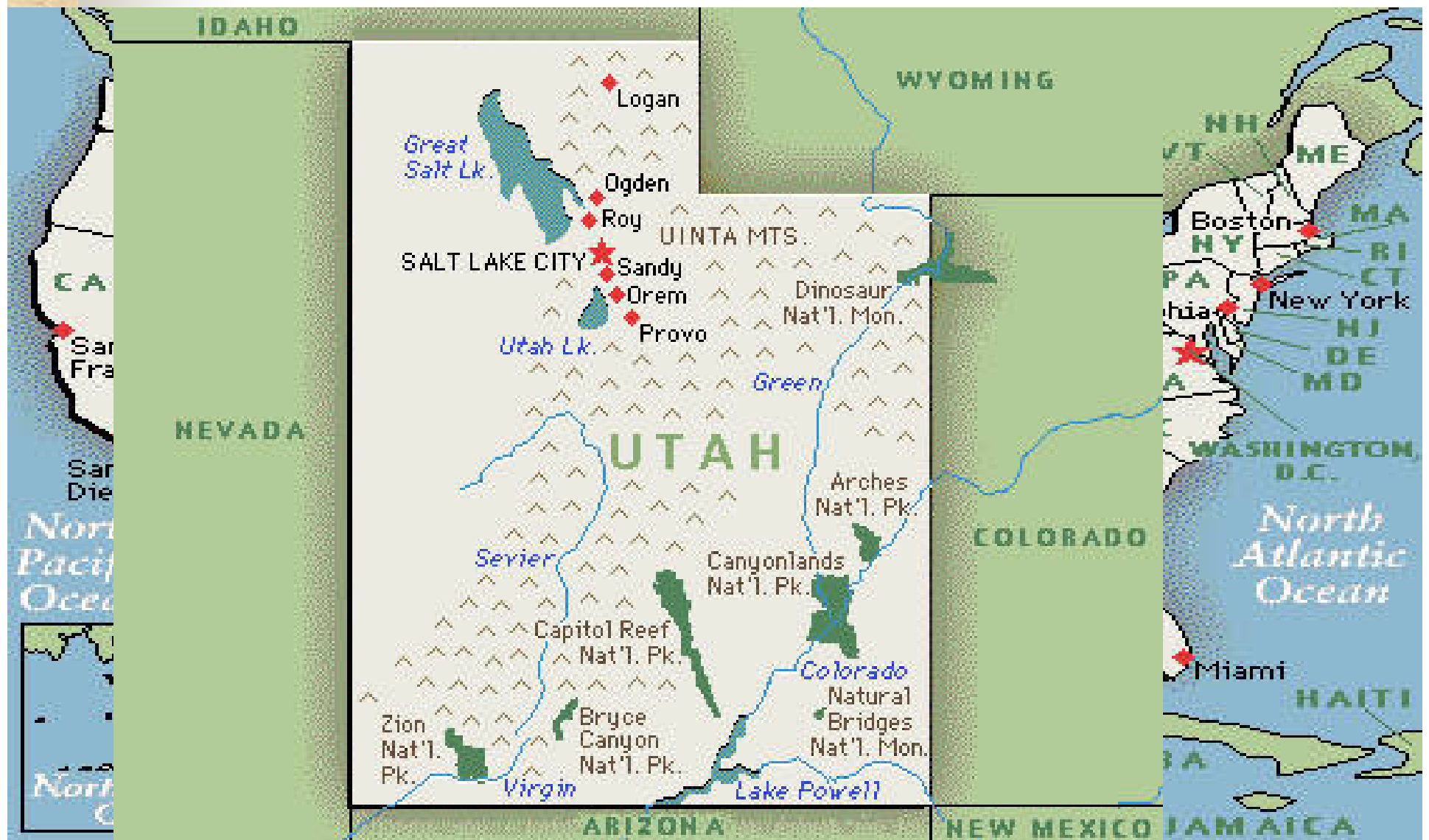
St Louis Encephalitis: Bird-Mosquito Cycle

West Nile Virus: Bird-Mosquito Cycle

Eastern Equine Encephalitis: Bird-Mosquito Cycle

LaCrosse Encephalitis: Bird-Mosquito Cycle

# Encephalitis In Utah



# Encephalitis In Utah



Western Equine Encephalitis

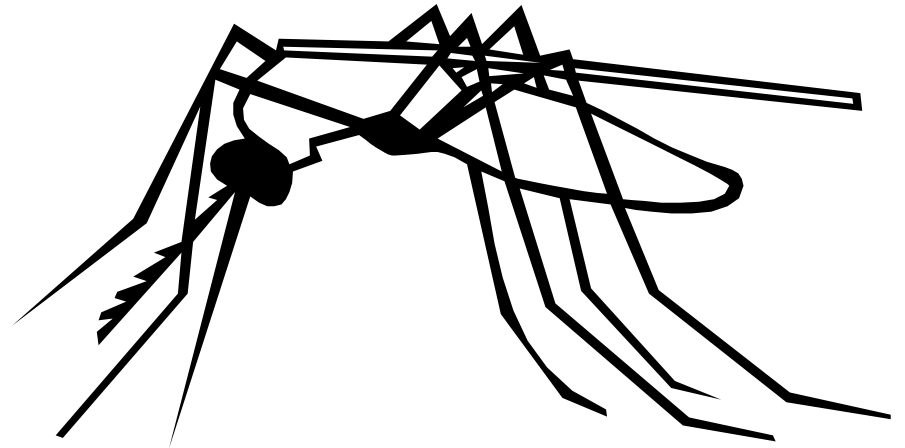
St Louis Encephalitis

West Nile Virus

# What does the West Nile Virus Mosquito look like?



There is **no such thing** as  
'the West Nile Virus  
Mosquito'!

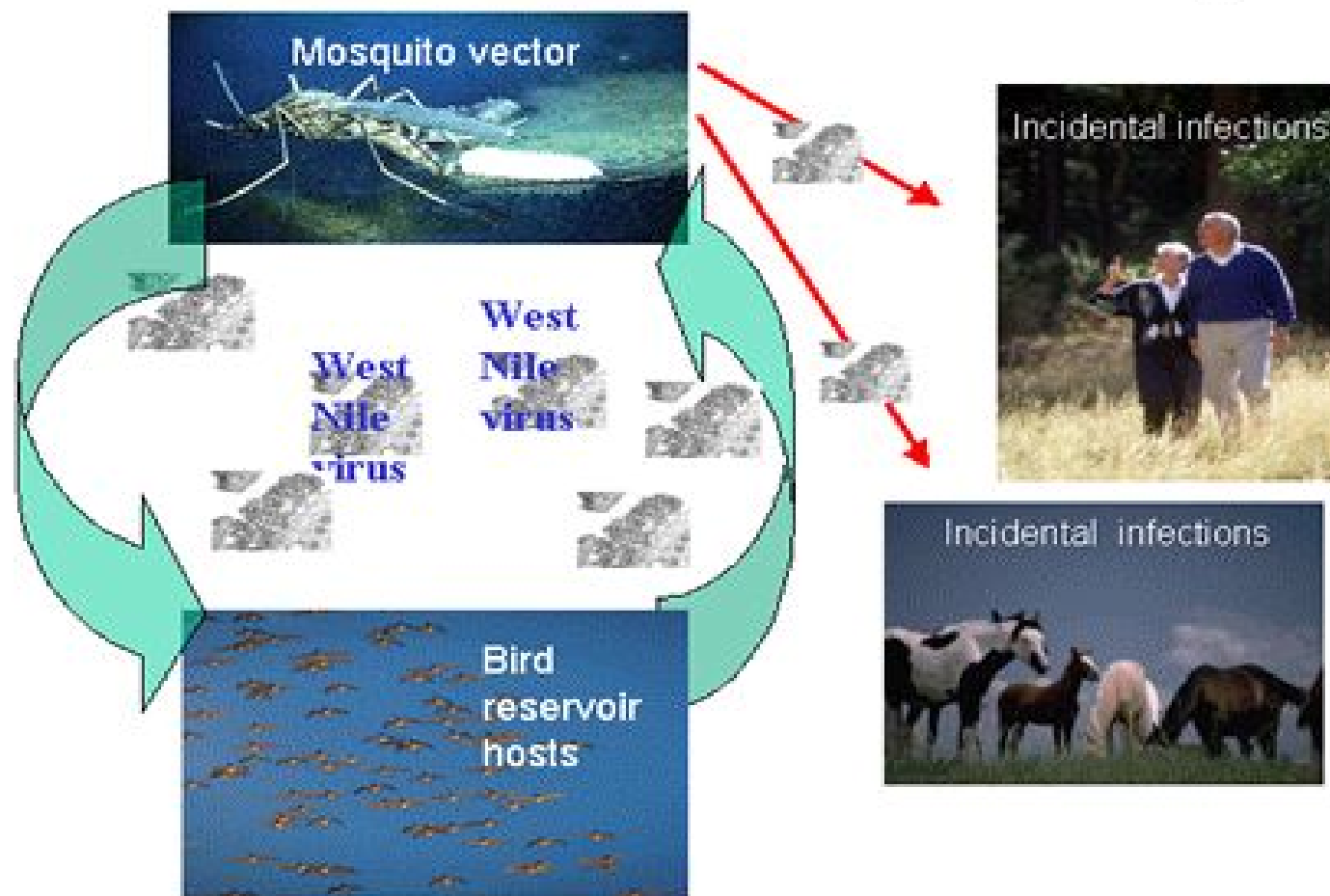


# Vector

An organism That Carries Pathogens from One Host To Another



# West Nile Virus Transmission Cycle

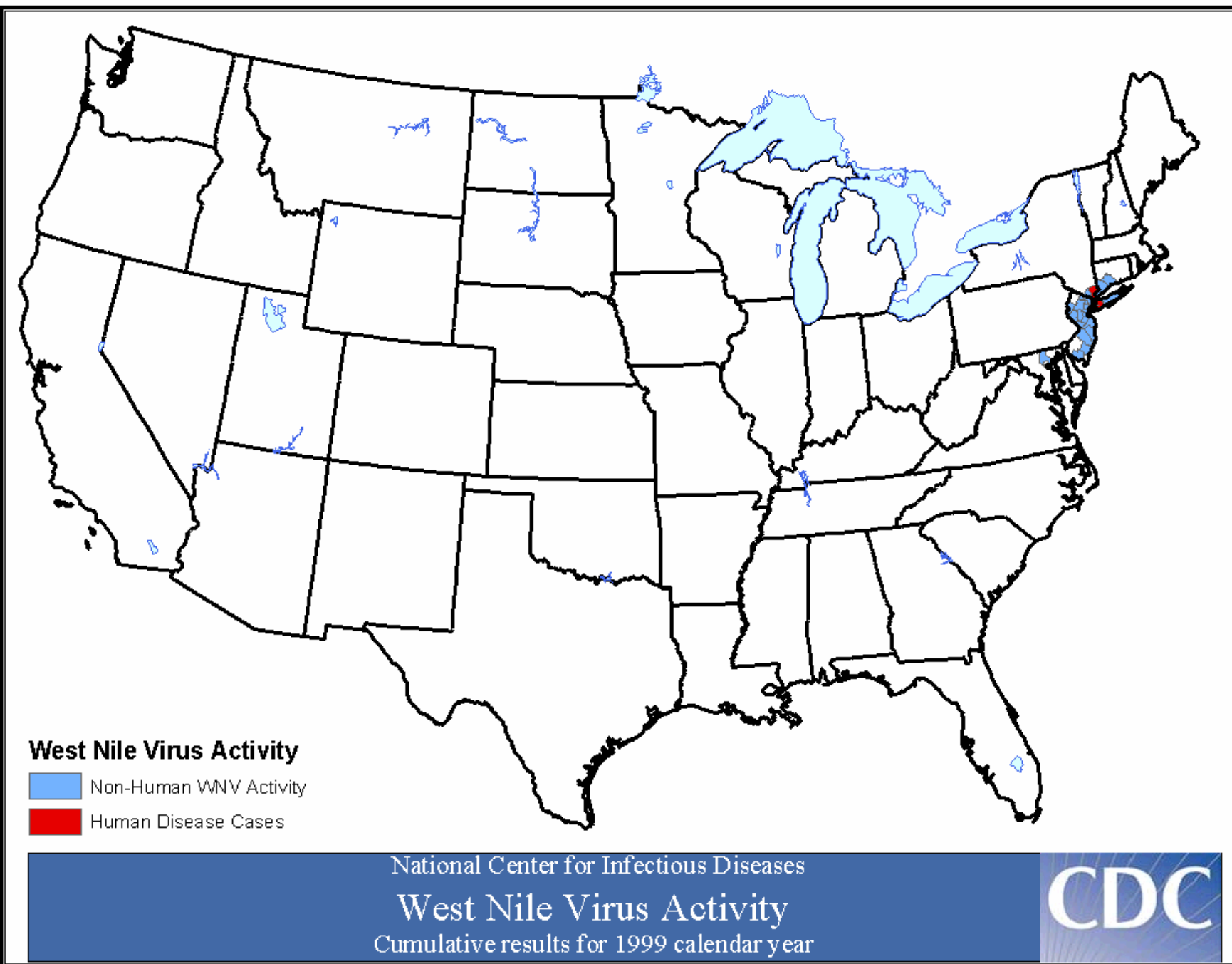


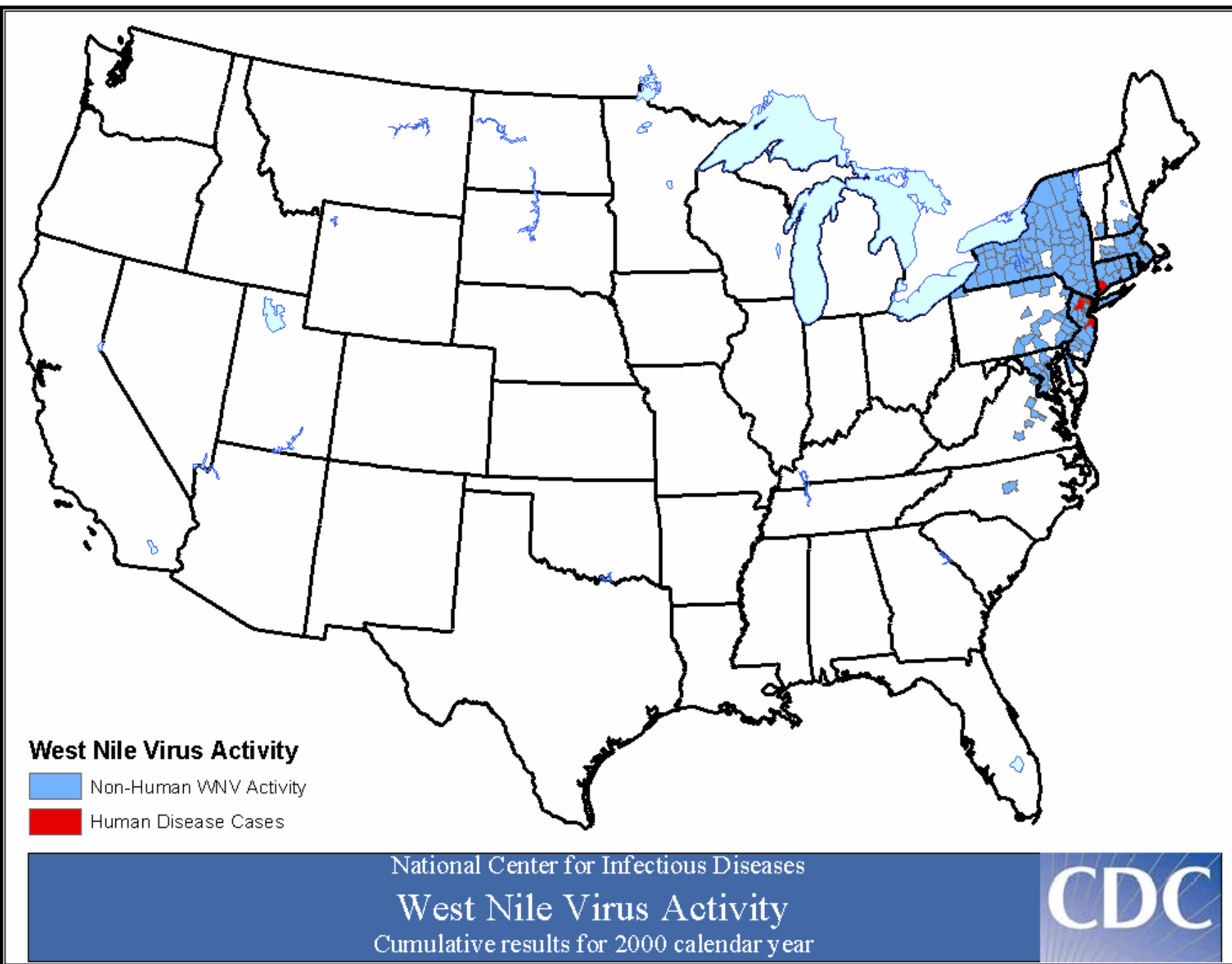
# Background

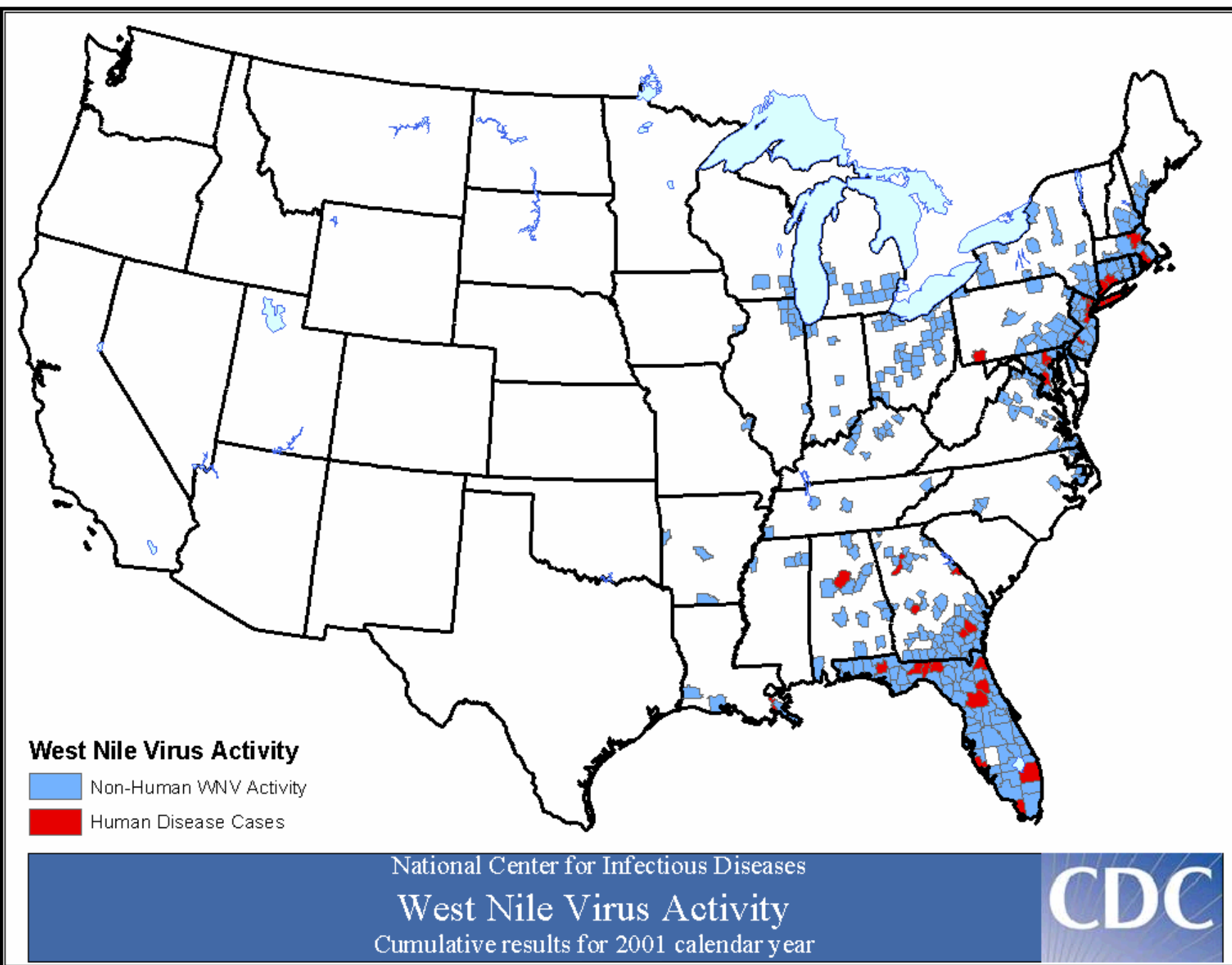
1st isolated:

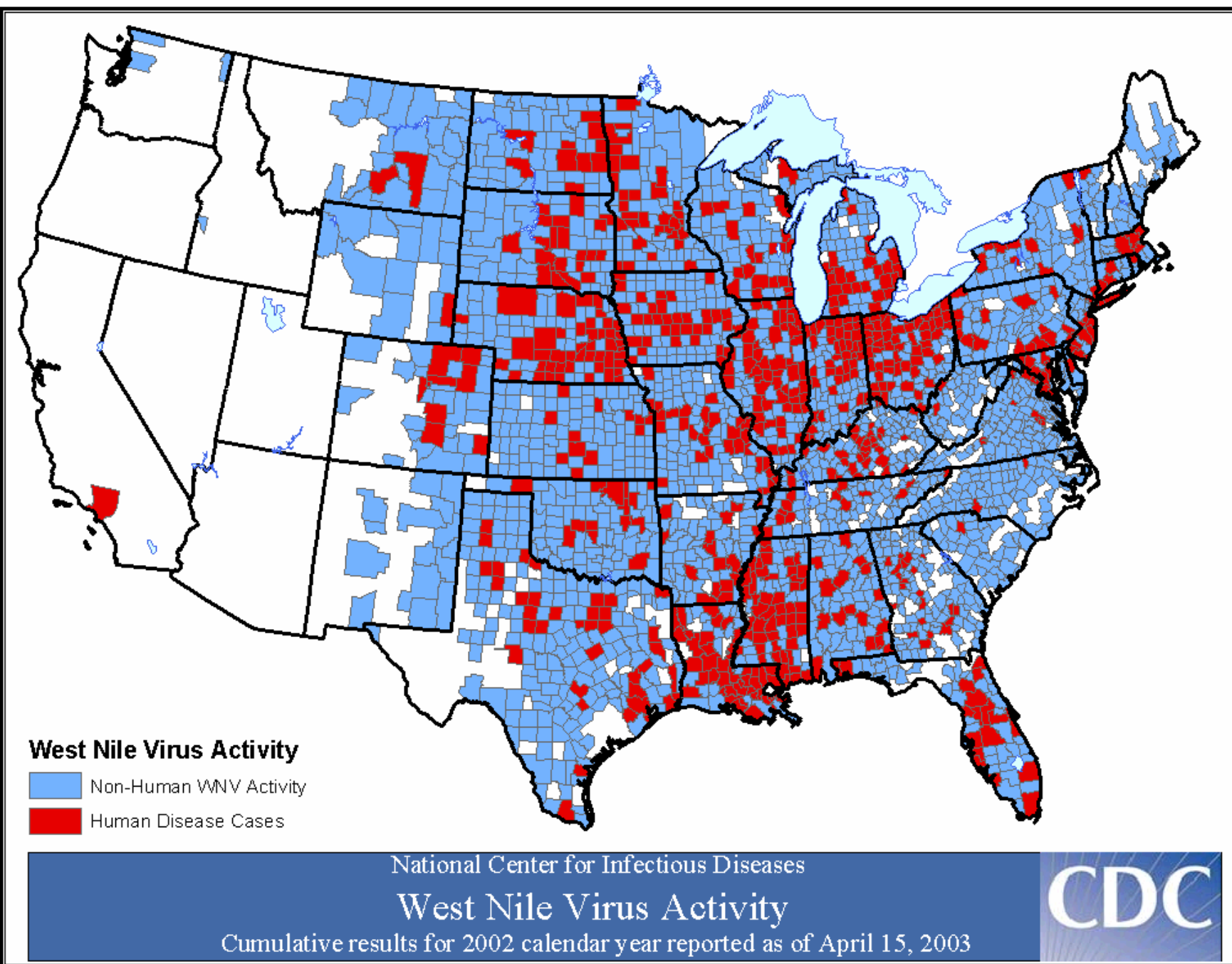
West Nile district, Uganda in 1937 from  
a woman with a fever

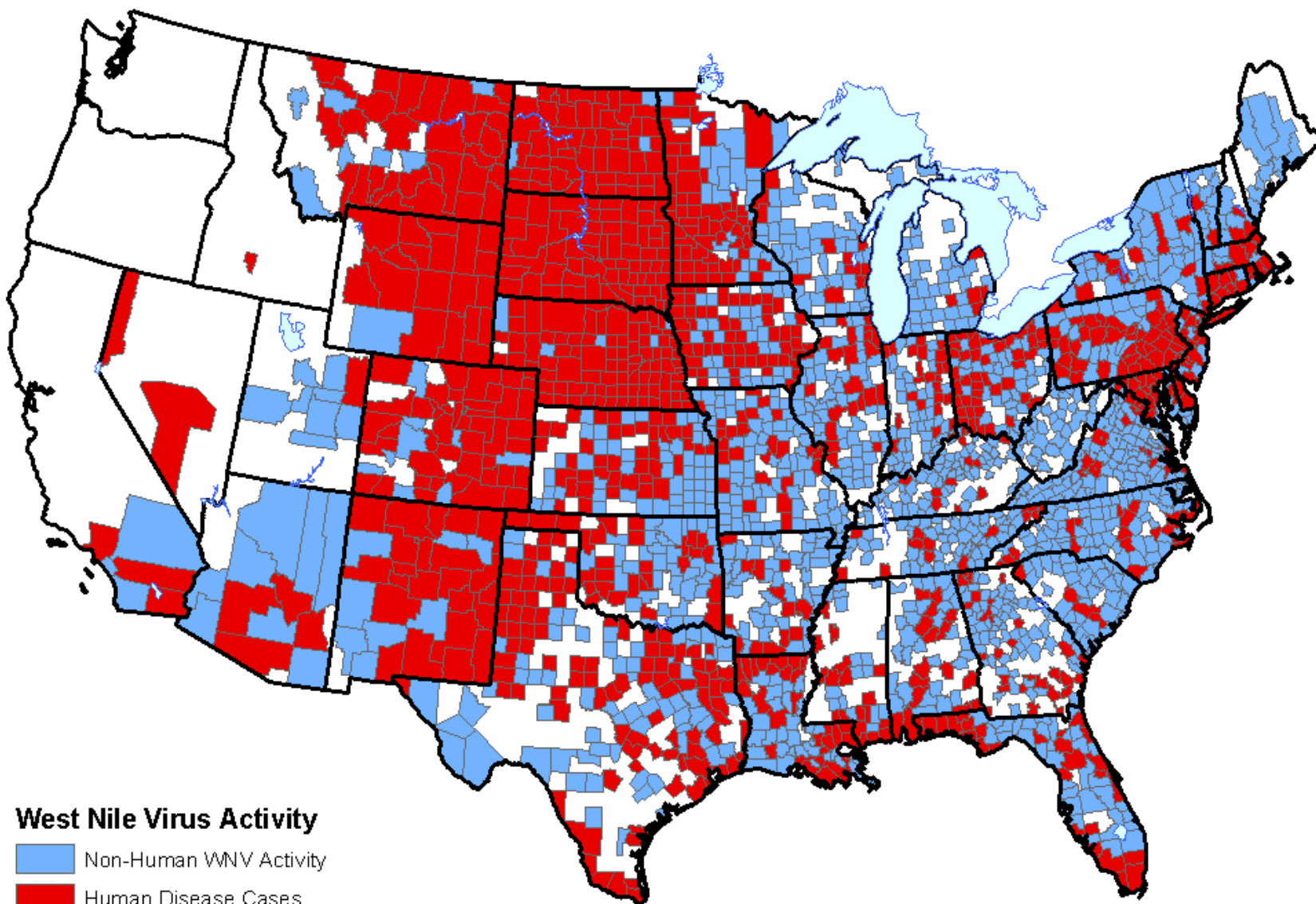












**West Nile Virus Activity**

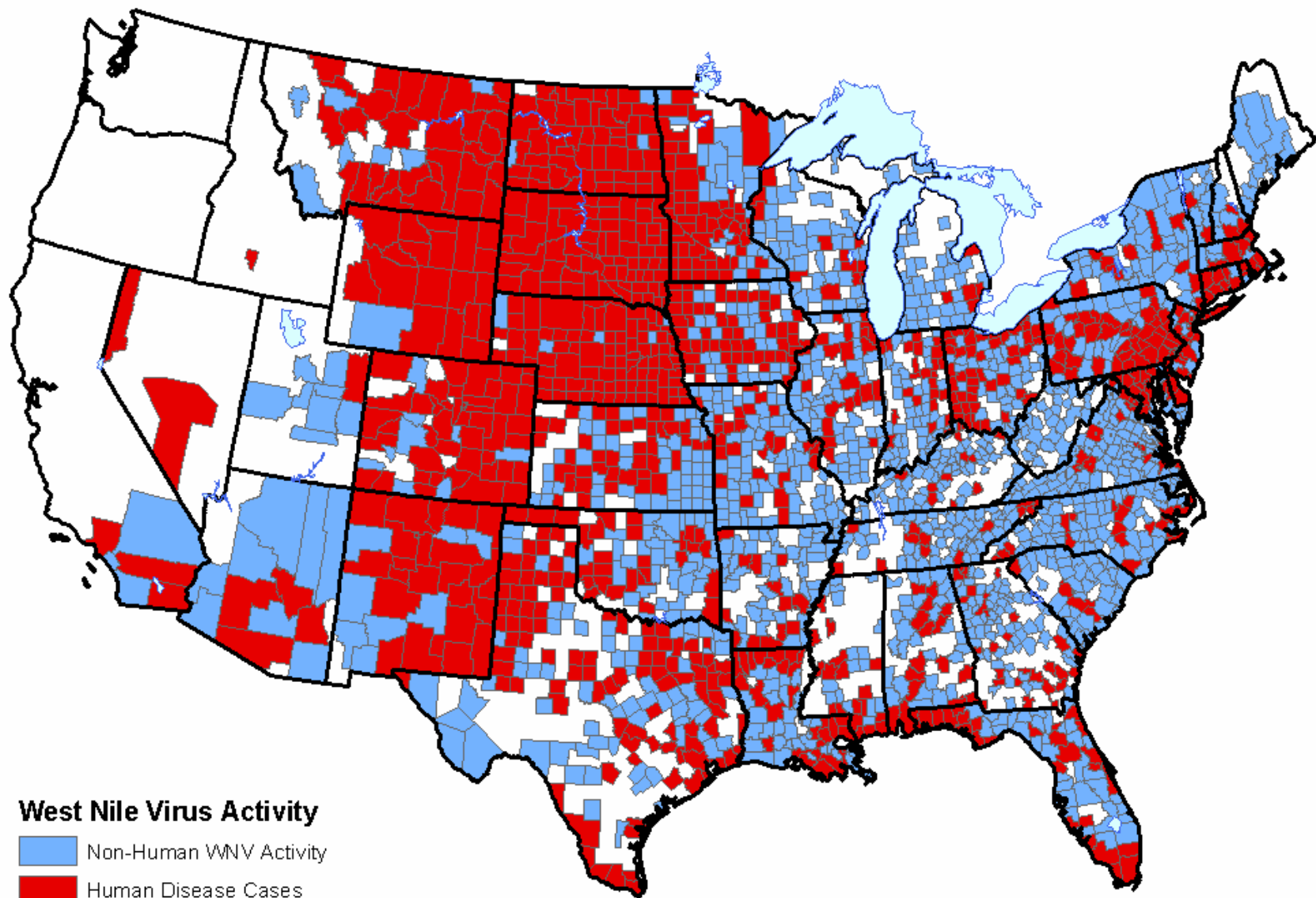
- Non-Human WNV Activity
- Human Disease Cases

National Center for Infectious Diseases

**West Nile Virus Activity**

Cumulative results for 2003 calendar year reported as of January 20, 2004

**CDC**



**West Nile Virus Activity**

- Non-Human WNV Activity
- Human Disease Cases

National Center for Infectious Diseases

**West Nile Virus Activity**

Cumulative results for 2003 calendar year reported as of January 20, 2004

**CDC**

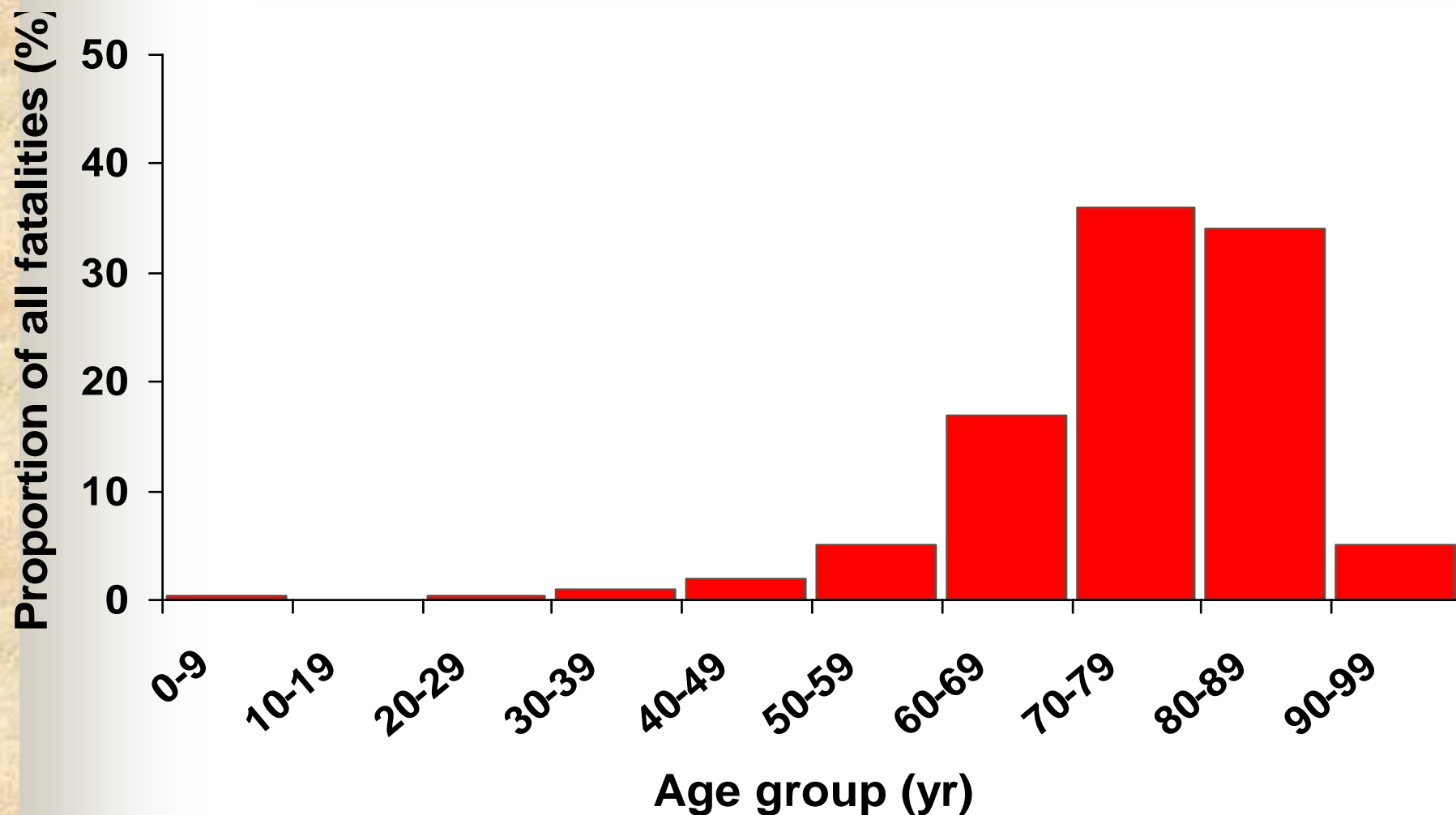
# Reported WNV Disease Cases in Humans, United States, 1999-2003\*

Year	# Cases	# States	# Counties	Onset Date Range
1999	62	1	6	2 AUG – 24 SEP
2000	21	3	10	20 JUL – 27 SEP
2001	66	10	39	13 JUL – 7 DEC
2002	4,156	39**	740	19 MAY – 19 DEC
2003	9,100	45**	1053	28 MAR – 3 DEC

\* Reported as of 1/20/2004

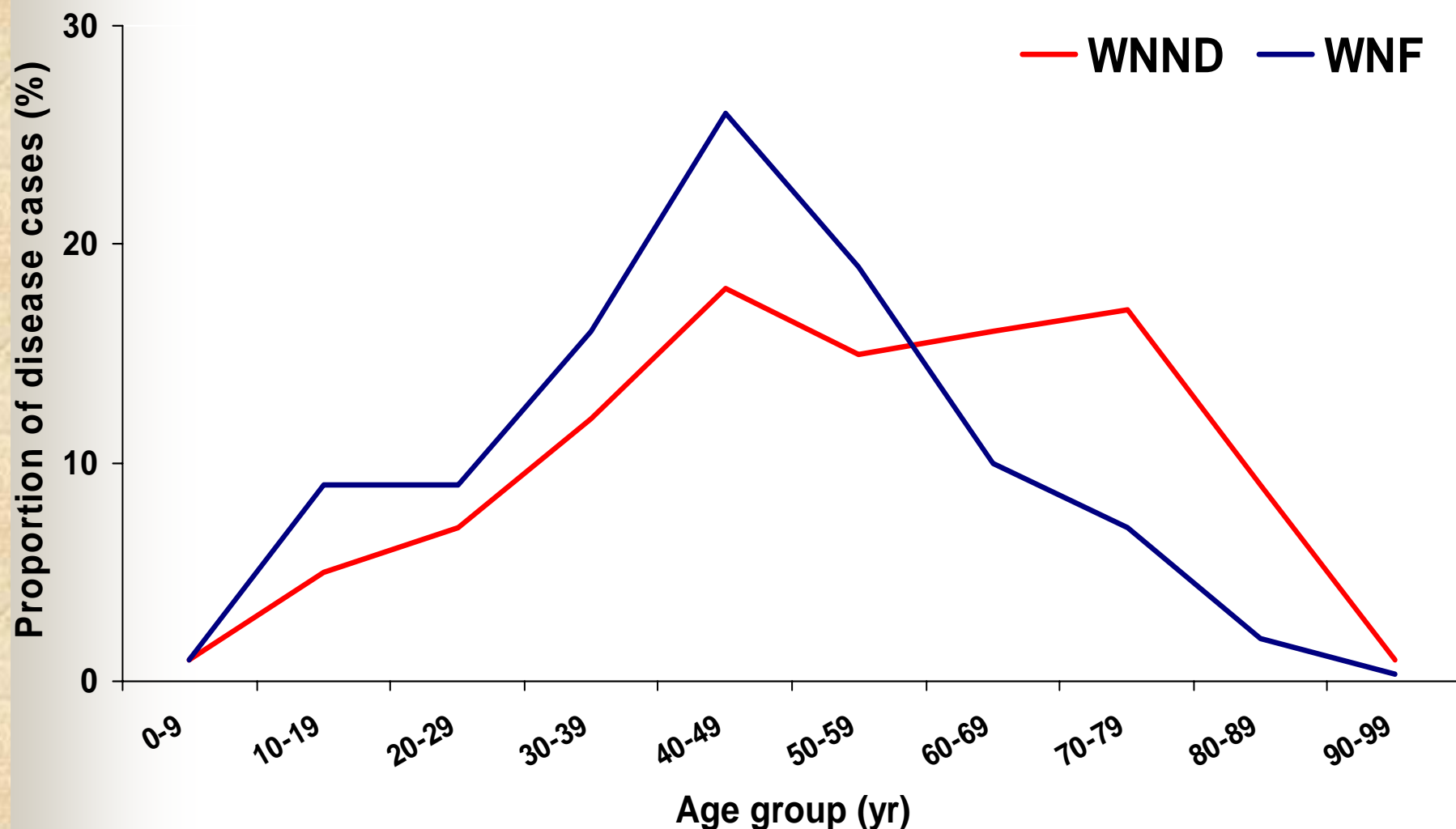
\*\* Plus D.C.

# Age Distribution of Fatal Human WNME Cases, United States, 2003\*



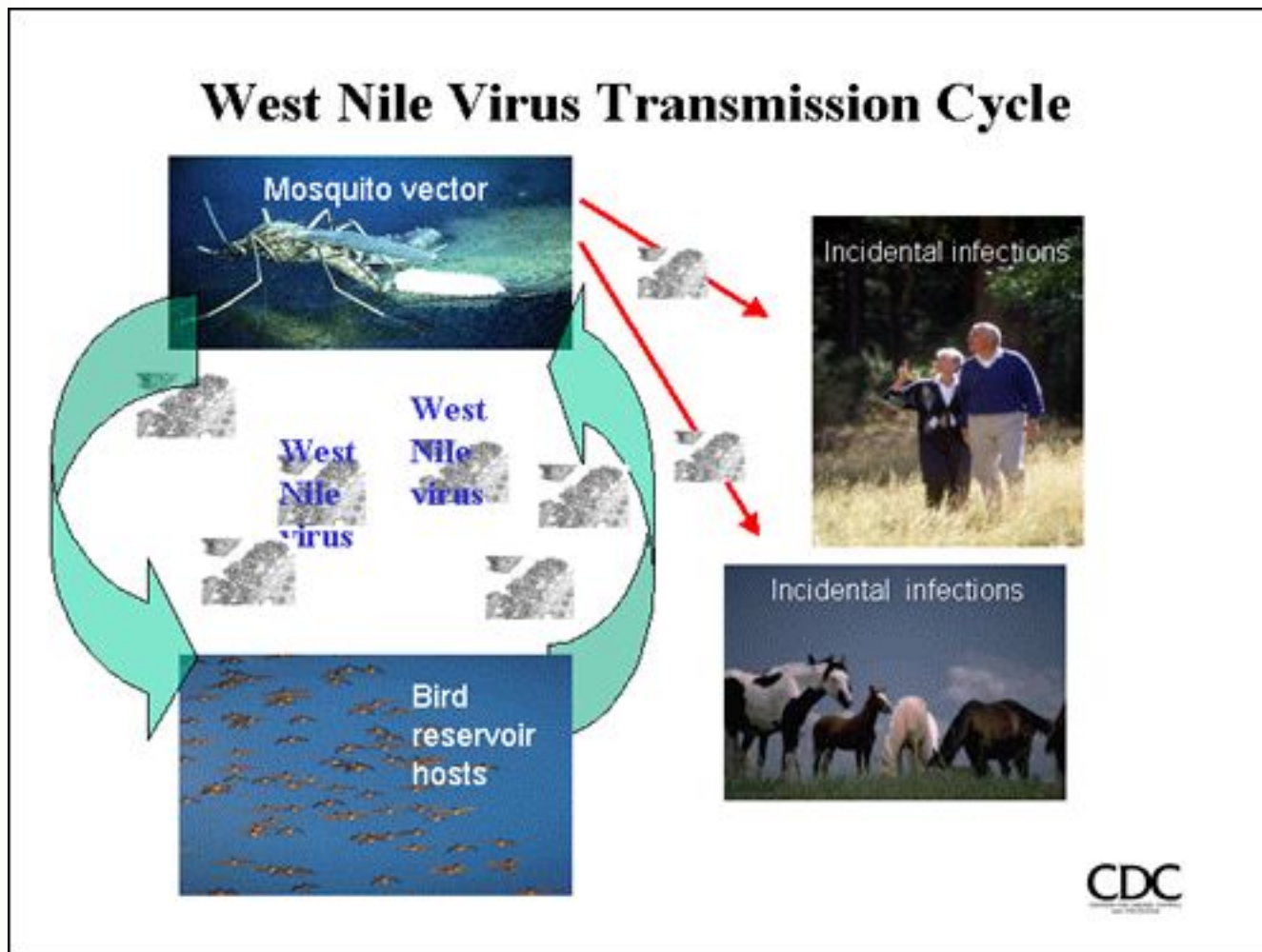
\* Reported as of 1/20/2003

# Human WNV Disease Cases, by Age Group and Clinical Category, United States, 2003\*



\* Reported as of 1/20/2004

# Encephalitis Transmission Cycle



# How did the Virus get to the U.S.

- Infected Human
- Human transported bird that was infected
- Storm transported infected bird
- Infected mosquito transported,  
or



WEEKLY WORLD  
**NEWS**  
October 1, 2002



**DOG MAKES  
\$60 MILLION  
AS A MODEL**

# AL QAEDA BREEDING KILLER MOSQUITOES

**WEST NILE VIRUS  
TERROR PLOT!**

**... & sending them to attack the U.S.**



\$1.79 U.S. / \$1.99 CANADA

40>

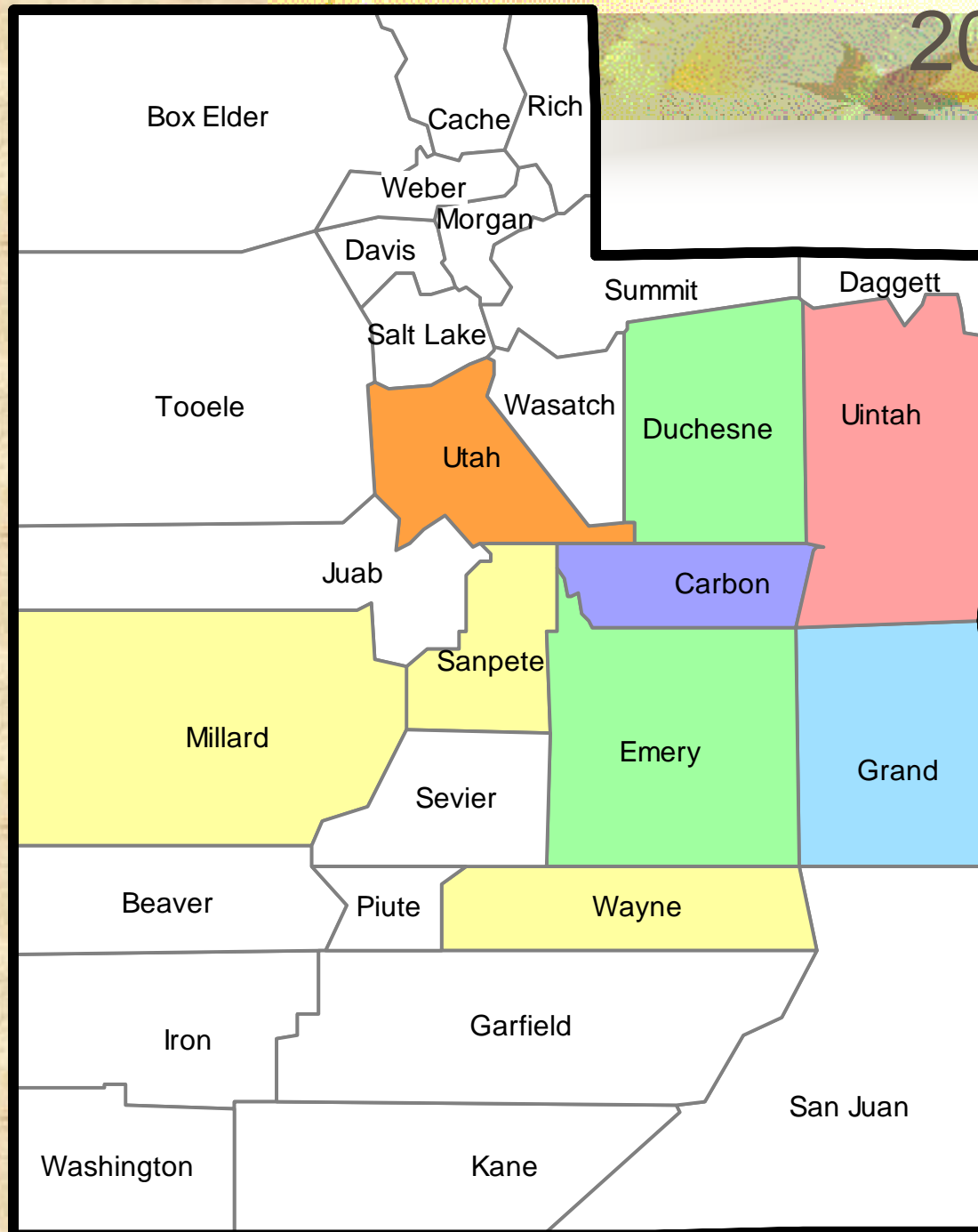
**COMPUTER  
CAUGHT SPYING  
ON GIRLS' DORM**



**INSIDE:  
HOW YOU CAN  
SURVIVE!**



# 2003 WNV in Utah



No activity

Human, Horses,  
Mosquitoes

Horses,  
Sentinel Chickens

Mosquitoes

Horses

Birds

Sentinel Chickens

# WNV

## 2004

No WNV Activity

Human

Human, Horse,  
Mosquito

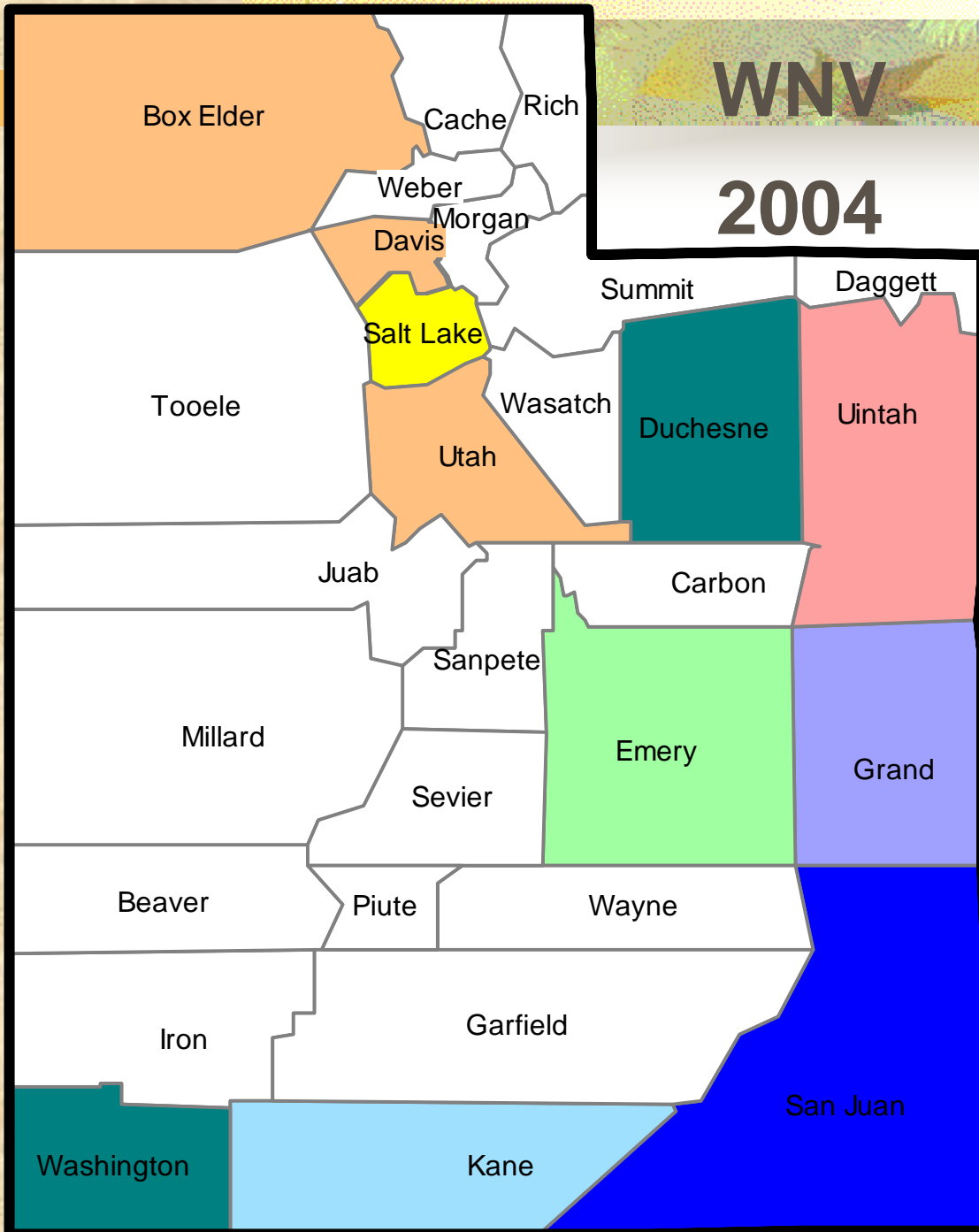
Chicken

Horse, Mosquito

Horse, Mosquito,  
Chicken, Bird

Bird

Human, Horse,  
Mosquito, Chicken

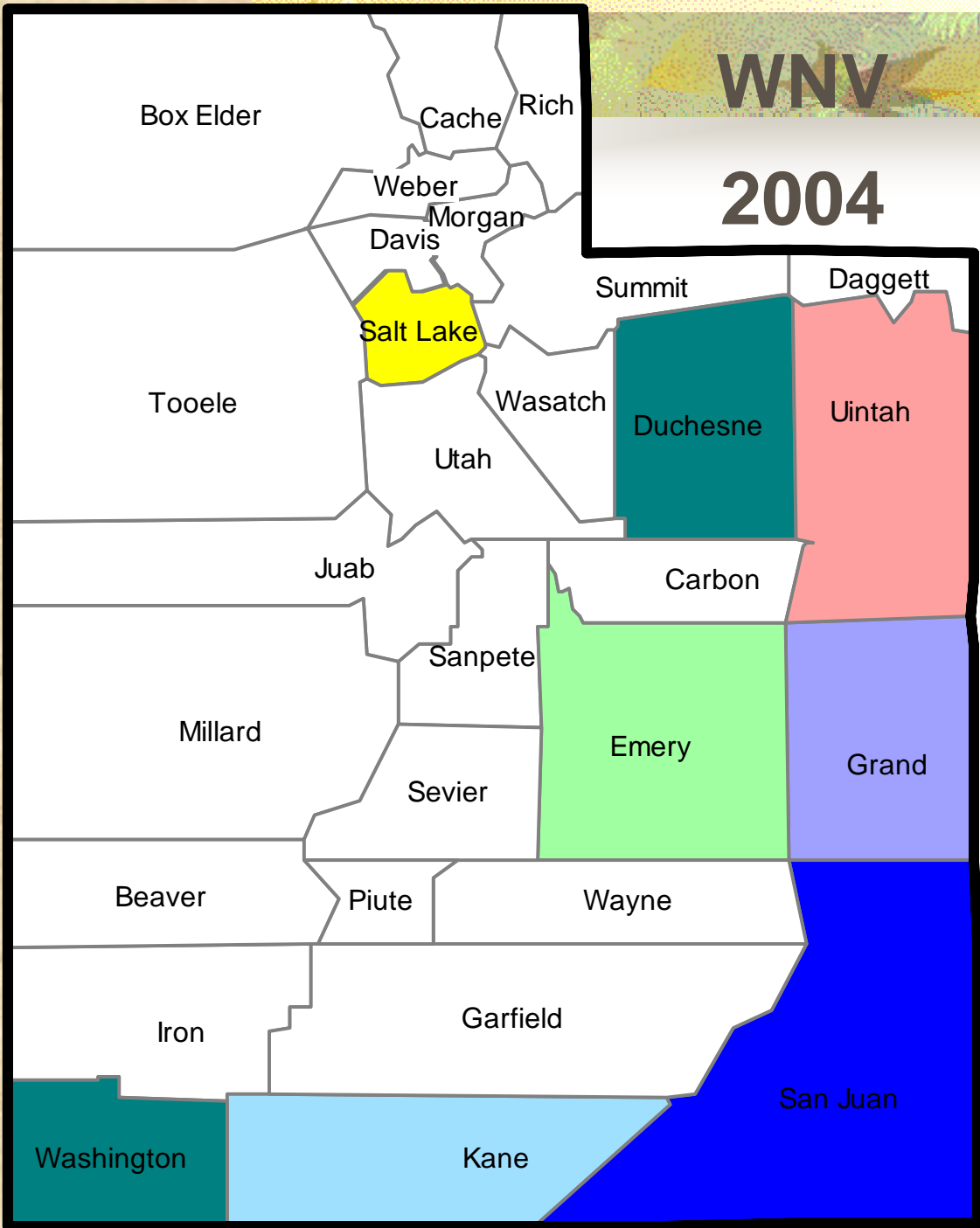


# WNV

## 2004

No WNV Activity

- Human
- Human, Horse, Mosquito
- Chicken
- Horse, Mosquito
- Horse, Mosquito, Chicken, Bird
- Bird
- Human, Horse, Mosquito, Chicken





# Facts About Getting West Nile Virus

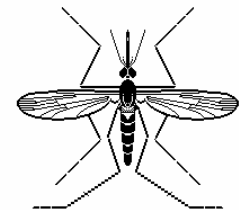
Only female mosquitoes bite.

Not all species of mosquitoes can transmit WNV.

Female mosquitoes must take at least two blood meals to transmit WNV.

Not everyone who gets bitten by an infected mosquito gets sick with WNV.

# Efforts to detect and contain the virus include:

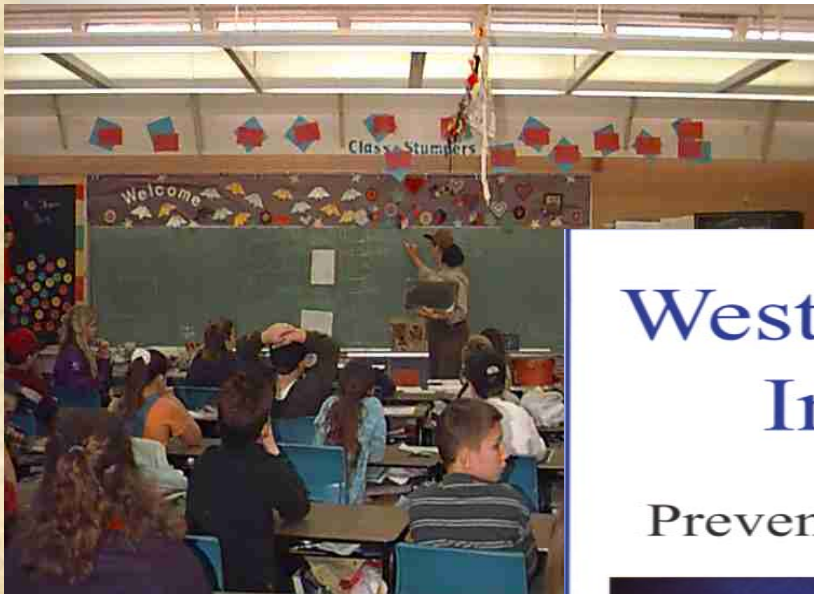


- \* Integrated Mosquito Management (IMM)
- \* Sampling mosquito and bird populations for West Nile virus
- \* Increasing surveillance of animals and humans for infection
- \* Increasing physician awareness and reporting of the virus so that its spread may be tracked
- \* Conducting public awareness campaigns to alert people as to how to reduce their risk of exposure to the virus

# Arboviral Disease Surveillance



# Education



## West Nile Virus Infection

Prevention and Control



*Culex* mosquito laying eggs.



## WEST NILE VIRUS

A POTENTIAL THREAT TO  
UTAH'S HORSES AND  
PEOPLE



Utah Department of  
Agriculture and Food  
Division of Animal Industry



# IMM – Water Management



# IMM – Larval Control

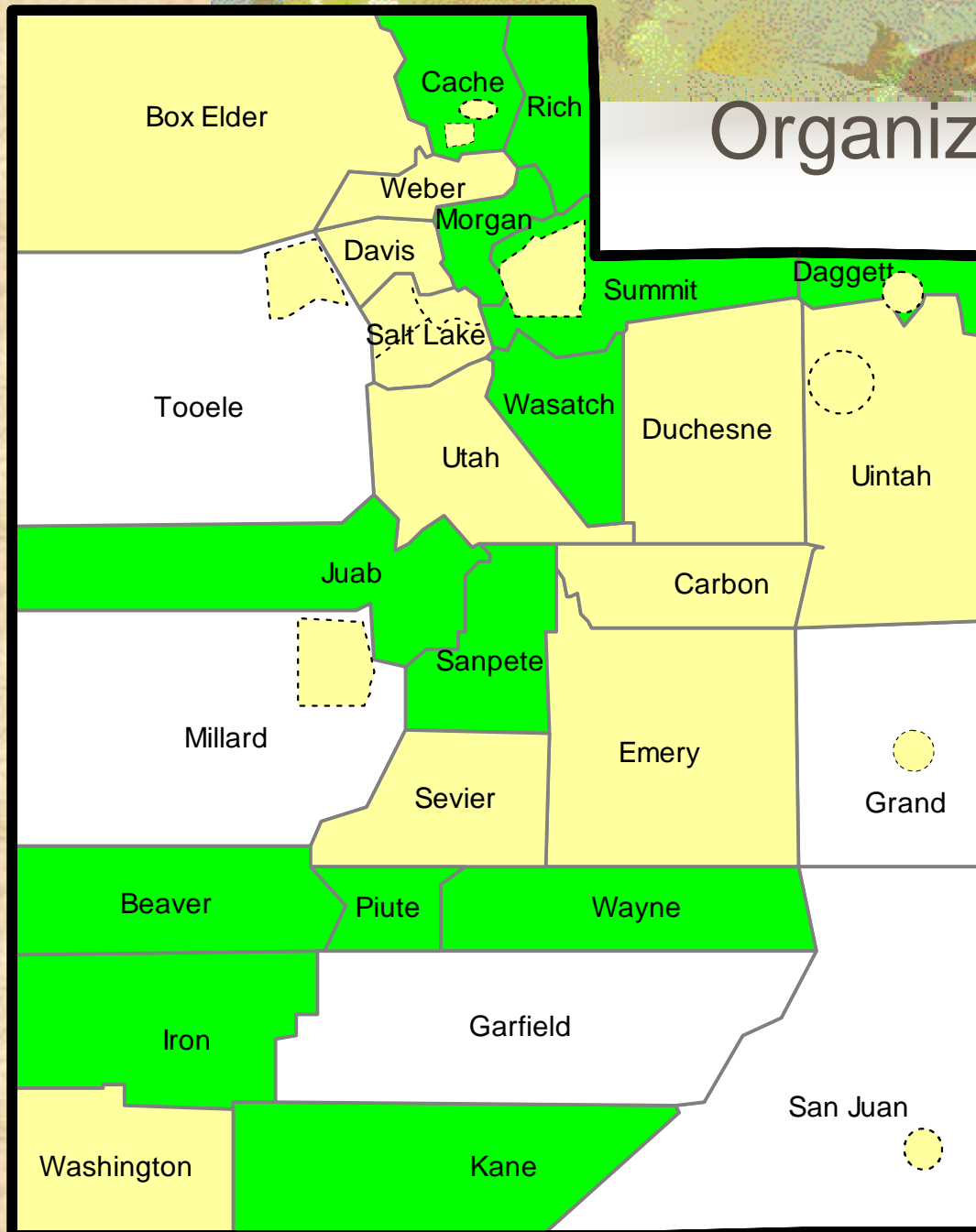


# IMM - Adult Mosquito Control



Ground or Aerial Applications

# Organized Mosquito Control in Utah



2003 - 21 agencies

10 - county wide

5 - single city

6 - more than one  
city, but not the  
whole county

2004 – New areas of  
control



## How Does This Effect You

- **Avoid** unnecessary outdoor activity when mosquitoes are most prevalent, such as dawn, dusk and early evening



# How Does This Effect You

**Wear** long-sleeved shirts and long pants when going into mosquito-infested areas.

- If workers are at the parks at **Dusk and Dawn**



# How Does This Effect You

- **Apply** an insect repellent that contains 20 percent to 30 percent DEET
  - Provide DEET products to workers
    - \*To minimize the risk of adverse reactions, apply it sparingly and avoid concentrations of more than 30 percent. Don't apply this type of insect repellent to children less than 3 years old. Be sure to follow the manufacturer's directions for use.
  - Spray Clothing with Mosquito Repellant

# Eliminate Stagnant Water Around Your House

Wheel Barrow

Trash Cans

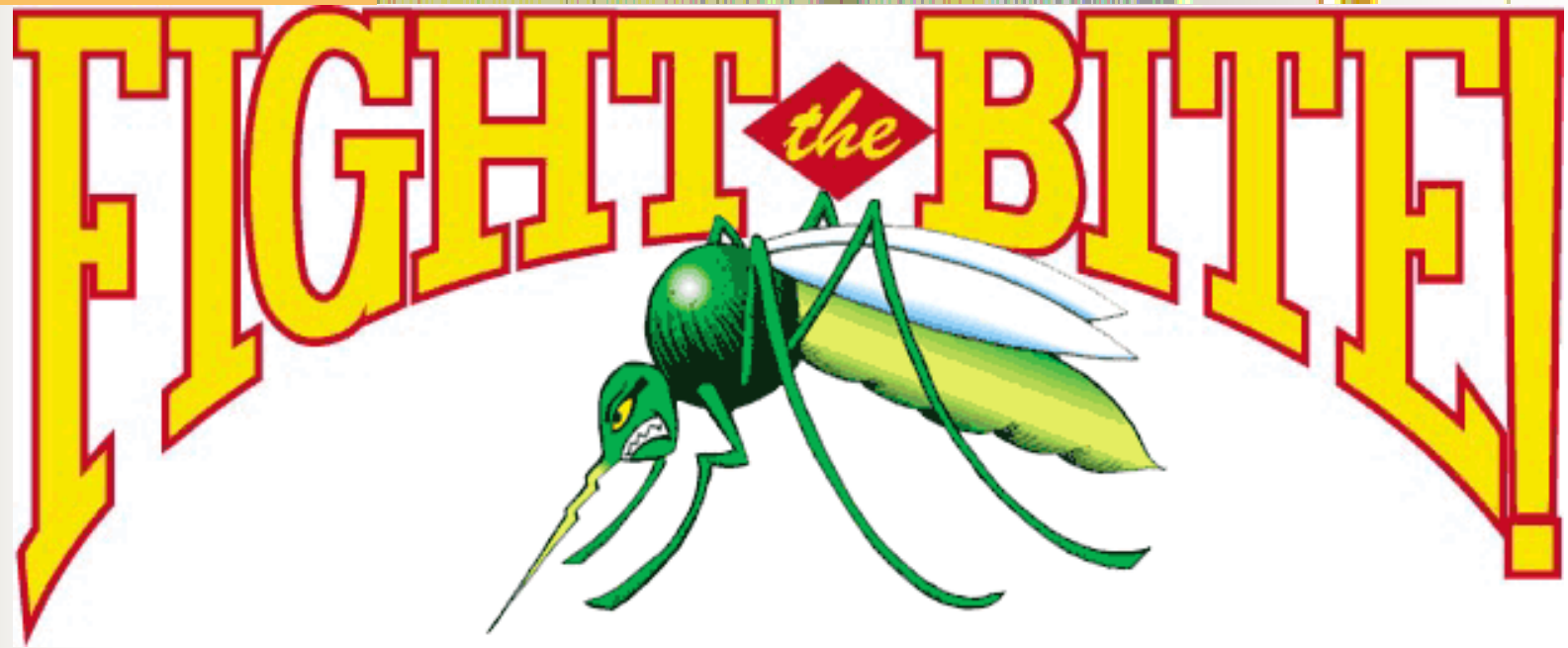
Bird Baths



Tires

Ornamental &  
Wading Pools

Leaky Sprinklers



Utah State Health Department

# To Reduce Your Exposure to Mosquitoes:

- \* **Avoid** unnecessary outdoor activity when mosquitoes are most prevalent, such as dawn, dusk and early evening.
- \* **Wear** long-sleeved shirts and long pants when going into mosquito-infested areas.
- \* **Apply** an insect repellent that contains 20 percent to 30 percent DEET. To minimize the risk of adverse reactions, apply it sparingly and avoid concentrations of more than 30 percent. Don't apply this type of insect repellent to children less than 3 years old. Be sure to follow the manufacturer's directions for use.
- \* **Spray** clothing with insect repellent



# REPELLENTS




N,N-diethyl-m-toluamide or, N,N-diethyl-3-methylbenamide



# Which mosquito repellent works the best?

The most effective repellents contain **DEET** (**N,N-diethyl-m-toluamide**), which is an ingredient used to repel pests like mosquitoes and ticks.



The more DEET a repellent contains the longer time it can protect you from mosquito bites.

A higher percentage of DEET in a repellent does not mean that your protection is better—just that it will last longer.

DEET concentrations higher than 50% do not increase the length of protection.

# How does the percentage of DEET in a product relate to the amount of protection it gives?

A recent study found products containing :

- **23.8%** DEET provided an average of **5** hours of protection from mosquito bites.
- **20%** DEET provided almost **4** hours of protection
- **6.65%** DEET provided almost **2** hours of protection
- **4.75%** DEET and **2%** soybean oil were both able to provide roughly **1 ½** hour of protection.



# How does mosquito repellent work?

Female mosquitoes bite people and animals because they need the protein found in **blood** to help develop their eggs.

Mosquitoes are attracted to people by skin odors and carbon dioxide from breath.



DEET does not kill mosquitoes; it just makes them unable to locate us.



# Are non-DEET repellents effective (e.g. Skin-So-Soft, plant-based repellents)?

Studies have suggested that other non-DEET products do not offer the same level of protection, or that protection does not last as long as products containing DEET.



# General safety considerations to remember when using products containing DEET?

- Always follow the recommendations appearing on the product label.
- Use enough repellent to cover exposed skin or clothing. Don't apply repellent to skin that is under clothing. Heavy application is not necessary to achieve protection.
- Do not apply repellent to cuts, wounds, or irritated skin.
- After returning indoors, wash treated skin with soap and water.
- Do not apply aerosol or pump products directly to your face.



Questions?

